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REMARKS

Claims 22-35, 38, 40, 43, and 45-47 are pending in the application with claims 27, 38, and 43 amended and claims 36, 37, 39, 41, 42, and 44 cancelled herein.

Claims 22-47 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Okase (U.S. Patent No. 5,884,009) in view of Sneh (U.S. Patent No. 6,305,314). Applicant requests reconsideration.

Claim 22 sets forth an ALD method that includes, among, other features, injecting at least one purge material into a deposition chamber defined at least in part by chamber walls, providing a solid barrier wall inside the chamber to separate the injected purge material from a substrate holder, and forming a purge curtain from the injected purge material. The solid barrier wall extends into the chamber from at least one of the chamber walls to elevationally below a substrate on the substrate holder. Pages 2-3 of the Office Action allege that Okase discloses every limitation of claim 22 except for the method including ALD and relies upon Sneh as disclosing ALD. Applicant traverses.

Page 3 of the Office Action alleges that second side wall 51b discloses the claimed solid barrier wall. However, as may be appreciated from column 9, line 64 to column 10, line 10 and column 11, lines 23-43 of Okase, second side wall 51b (along with first side wall 51a) is part of process gas supply unit 5 suspended in first vessel 1 by lifting shafts 54a and 54b. Consequently, second side wall 51b does not extend into first vessel 1 from one of the

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vessel walls defining first vessel 1 to below a substrate. At least for such reason, Okase does not disclose the claimed solid barrier wall.

Notably, second vessel 2 may not be considered to disclose the claimed deposition chamber since claim 22 sets forth providing the solid barrier wall inside the chamber. Okase does not disclose a solid barrier wall inside second vessel 2.

Applicant acknowledges a description in the text associated with Fig. 7 of Okase regarding side wall 71. However, side wall 71 does not disclose the claimed solid barrier wall since side wall 71 includes an opening 71a through which to carry a wafer W, as shown in Figs. 8A and 8B. As a result, side wall 71 is not a solid barrier within the meaning of claim 22. Modification of Okase to eliminate opening 71a is not appropriate since it would frustrate the intended purpose of Okase or change its principle of operation by requiring some other means to insert wafer W.

Sneh does not remedy and is not alleged to remedy the deficiencies of Okase described above. At least for such reasons, claim 22 is patentable over the cited combination. Claims 23-26 depend from claim 22 are patentable at least for such reason as well as for the additional limitations of such claims not disclosed or suggested.

Amended claim 27 incorporates the entire subject matter of previous claims 36 and 37 to set forth an ALD method that includes, among other features, injecting a precursor into a deposition chamber and separately injecting a purge material at a first flow rate through at least one purge passageway through a lid into the chamber. The injected purge material

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flows along at least a portion of the chamber walls. The method includes separating the injected purge material from a substrate holder with a flow director, ceasing the precursor injection, substituting the precursor injection for additional purge material injection, and adjusting the first flow rate to a second flow rate different from the first flow rate.

Review of both Okase and Sneh reveals that neither reference discloses ceasing the precursor injection and substituting purge material. Also, neither reference discloses adjusting the purge material first flow rate to a second flow rate during the substitution. The Office Action does not allege otherwise. Accordingly, Okase in view of Sneh fails to disclose every limitation of claim 27 now setting forth the previous limitations of claims 36 and 37. Claims 28-35 depend from claim 27 and are patentable at least for such reason as well as for the additional limitations of such claims not disclosed or suggested.

Amended claim 38 incorporates the entire subject matter of previous claim 39 to set forth an ALD method that includes, among other features, injecting a deposition precursor into a deposition chamber, ceasing delivery of the precursor, and delivering purge material through the process chemical port. The method includes separately delivering a purge material through at least one purge port in a lid while delivering the purge material through the process chemical port, the purge material not being injected through the purge port during injection of the precursor through the process chemical port.

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Review of both Okase and Sneh reveals that neither reference discloses delivering purge material through the process chemical port. Also, Okase expressly teaches against not injecting purge gas while injecting process gas, as discussed at least in column 13, lines 1-7. The purge gas in Okase provides the desired advantages, which would be frustrated if purge gas was not injected during injection of the process gas. Accordingly, Okase in view of Sneh fails to disclose every limitation of claim 38 now setting forth the previous limitations of claim 39. Claim 40 depends from claim 38 and is patentable at least for such reason.

Amended claim 43 incorporates the entire subject matter of previous claim 44 to set forth an ALD method that includes, among other features, injecting at least one purge material into a deposition chamber, injecting a first deposition precursor into a deposition chamber, and forming a purge curtain from injected purge material. The method includes ceasing delivery of the first precursor into the chamber, flowing the injected purge material, and forming the purge curtain while delivering purge material through the process chemical port.

Review of both Okase and Sneh reveals that neither reference discloses delivering purge material through the process chemical port. Also, neither reference discloses forming the purge curtain while delivering purge material through the process chemical port. Accordingly, Okase in view of Sneh fails to disclose every limitation of claim 43 now setting forth the previous limitations of claim 44. Claims 45-47 depend from claim 44 and are patentable at least for such reason.

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At least for the reasons described above, Applicant asserts that claims 22-35, 38, 40, 43, and 45-47 are patentable and requests allowance in the next Office Action.

Claims 22-47 stand rejected under 35 U.S.C. 103(a) as being unpatentable over DiMeo, Jr. (U.S. Patent No. 6,972,430) in view of Ohashi (U.S. Patent No. 6,059,885), in further view of Yamamuka (U.S. Patent No. 6,312,526). Applicant requests reconsideration.

The subject matter of the rejected claims is described above. Page 4 of the Office Action alleges a motivation exists to modify DiMeo with the teachings of Ohashi since "[b]y doing so, particles are prevented from adhering to the walls of the chamber" in DiMeo. That is, the Office Action essentially alleges particles are inherently generated in the DiMeo process, that those of ordinary skill recognize the inherent generation of particles, and that those of ordinary skill are motivated to modify DiMeo according to the teachings of Ohashi, allegedly performing the claimed ALD method.

However, "the mere fact that a certain thing may result from a given set of circumstances is not sufficient to establish inherency." In re Rijckaert, 9 F.3d 1531, 1534, 28 USPQ2d 1955, 1957 (Fed. Cir. 1993) (citations omitted) (emphasis in original); MPEP § 2112. Further, "[i]n relying upon the theory of inherency, the Examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art." Ex parte Levy, 17 USPQ2d 1461, 1464 (Bd. Pat. App. & Inter. 1990) (emphasis added); MPEP § 2112.

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Review of the Office Action does not reveal any basis in fact and/or technical reasoning to establish that DiMeo inherently generates particles during deposition. It is not relevant that the DiMeo process might generate particles, it must necessarily generate particles. Also, the Office Action does not provide any evidence that those of ordinary skill recognize such allegedly inherent generation of particles given the distinct differences between the DiMeo and Ohashi methods, as further discussed below. If those of ordinary skill do not recognize the problem, then they cannot be motivated to find a solution to it.

Accordingly, applicant asserts that no motivation exists to combine DiMeo and Ohashi. Page 4 of the Office Action alleges a motivation to modify DiMeo by using the straightening gas of Ohashi to prevent particles from adhering to walls of the chamber, as taught by Ohashi. However, thorough review of Ohashi and comparison to the DiMeo digital CVD process reveals that the particles generated in the Ohashi process do not occur in the DiMeo process. Accordingly, no motivation exists to modify DiMeo by including the Ohashi straightening gas. Yamamuka does not remedy the deficiencies of DiMeo and Ohashi.

Fig. 3 of DiMeo reveals that providing precursor reactant source 44 is always separated from providing oxidant reactant source 48 by inert purge gas 46. That is, as taught by DiMeo, at no time are precursor reactant source 44 and oxidant reactant source 48 intentionally provided within reactor chamber 10 at the same time. Such a circumstance may be contrasted with the processing shown in Fig. 14 of Ohashi that generates particles. As those

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of ordinary skill clearly understand from the discussion in column 2, line 44 to column 3, line 8 of Ohashi, the gas phase reaction and formation of particles only occurs in circumstances where reactants are provided together. If only one type of reactant is provided, then such reactant does not react with itself in the gas phase to form particles. Accordingly, those of ordinary skill would consider DiMeo to eliminate the particle generation problem of Ohashi by providing precursor reactant source 44 separate from oxidant reactant source 48, as is conventional during digital CVD. Thus, those of ordinary skill would not find any motivation to modify DiMeo with the straightening gas of Ohashi since it would apparently not provide any benefit in the DiMeo method.

As disclosed in paragraphs 26 and 27, only the Applicant's own specification identifies an advantage to providing targeted purging in ALD (where precursors are provided separately). The targeted purging may remove residual precursors that remain in chamber dead spaces after conventional purging between precursor flows. None of the cited references, including Yamamuka, comprehend such an advantage. Thus, Applicant asserts that the Office's conclusion of obviousness is based on improper hindsight reasoning.

Applicant acknowledges that judgments on obviousness may necessarily involve a reconstruction based in a sense on hindsight reasoning. However, such reconstruction can only take into account knowledge that was within the level of ordinary skill in the art at the time the claimed invention was made and cannot include knowledge gleaned only from Applicant's

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disclosure. In re McLaughlin, 443 F.2d 1392, 1395, 170 USPQ 209, 212 (CCPA 1971); MPEP 2145(X)(A).

Applicant asserts that some motivation in the art must exist to support a combination of references, that the allegedly inherent motivation alleged by the Office is not properly supported, and that the Office Action does not identify any valid suggestion in the prior art of the desirability of the proposed DiMeo modification. At least for such reasons, Applicant asserts that the cited combination cannot be considered to disclose or suggest every limitation of the rejected claims.


Further, amended claim 27 sets forth an ALD method that includes, among other features, chemisorbing only one monolayer of precursor material on the substrate in the absence of another deposition precursor. Similarly, amended claim 38 sets forth chemisorbing only one monolayer of precursor material on the substrate in the absence of any additional deposition precursor. Also, amended claim 43 sets forth chemisorbing only one monolayer of second precursor material on the first monolayer in the absence of the first precursor not chemisorbed. Pursuant to the express teachings of Ohashi, such reference bears no applicability to the claimed methods since the type of particles generated in the Ohashi CVD method do not occur in the claimed method. Thus, those of ordinary skill would not turn to Ohashi to modify an ALD method. Only the Applicants own specification recognizes both the problem particular to ALD and the claimed solution.

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Applicant herein establishes adequate reasons supporting patentability of pending claims 22-35, 38, 40, 43, and 45-47 and requests allowance of all pending claims in the next Office Action.

Respectfully submitted,

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